

What is claimed is:

1 1. A method of forming a contact opening comprising
2 the steps of:

3 providing a substrate having a transistor thereon, each
4 comprising a gate electrode and doping areas, the
5 gate electrode is protected by a silicon-
6 containing insulator layer;

7 coating a non-silicon-containing resist layer on the
8 substrate of the transistor, with a level
9 surface;

10 coating a silicon-containing resist layer on the non-
11 silicon-containing resist layer, with a level
12 surface;

13 patterning the silicon-containing resist and the non-
14 silicon-containing resist layer to form a resist
15 stacked layer with a contact plug pattern
16 overlying the doping areas;

17 forming an insulator layer using a selective deposition
18 process on the substrate unmasked by the resist
19 stacked layer; and

20 removing the resist stacked layer to expose the doping
21 area, forming a contact opening.

1 2. The method of claim 1, wherein the silicon-
2 containing insulator layer is silicon nitride.

1 3. The method of claim 1, wherein a thickness of the
2 non-silicon-containing resist layer is 4000~8000Å.

1 4. The method of claim 1, wherein a thickness of the
2 silicon-containing resist layer is 500~4000Å.

1 5. The method of claim 1, wherein the method of
2 patterning the non-silicon-containing resist layer and the
3 silicon-containing resist layer comprising the steps of:

4 patterning the silicon-containing resist layer using a
5 lithography process; and
6 using the silicon-containing resist layer as a mask,
7 etching the non-silicon-containing resist layer
8 thereunder.

1 6. The method of claim 5, wherein the method of
2 etching the non-silicon-containing resist layer comprises
3 using SO₂/O₂ as etching gases.

1 7. The method of claim 1, wherein the selective
2 deposition process is liquid phase oxide deposition (LPOD).

1 8. The method of claim 7, wherein the process of the
2 liquid phase oxide deposition comprises immersing the
3 substrate surface in H₂SiF₆ solution with H₃BO₃.

1 9. The method of claim 7, wherein the process of the
2 liquid phase oxide deposition comprises immersing the
3 substrate surface in H₂SiF₆ and NH₃ solution.

1 10. The method of claim 1, further comprising:
2 filling a metal material into the contact opening of
3 the insulator layer to form a contact plug.

1 11. A method of forming a contact opening comprising
2 the steps of:
3 providing a substrate having a device thereon, the
4 device is protected by a silicon-containing
5 insulator layer, with a doping area;
6 coating a non-silicon-containing resist layer on the
7 substrate of the device and the doping area, with
8 a level surface;
9 coating a silicon-containing resist layer on the non-
10 silicon-containing resist layer, with a level
11 surface;
12 patterning the silicon-containing resist layer and the
13 non-silicon-containing resist layer to form a
14 resist stacked layer with a contact plug pattern
15 overlying the doping areas, the surface unmasked
16 by the resist stacked layer comprises a portion
17 of the silicon-containing insulator layer, a
18 silicon and/or silicon oxide material;
19 forming an insulator layer using a selective deposition
20 process on the surface of the silicon and/or
21 silicon oxide material; and
22 removing the resist stacked layer to expose the doping
23 area, forming a contact opening.

1 12. The method of claim 11, wherein the silicon-
2 containing insulator layer is silicon nitride.

1 13. The method of claim 11, wherein a thickness of the
2 non-silicon-containing resist layer is 4000~8000Å.

1 14. The method of claim 11, wherein a thickness of the
2 silicon-containing resist layer is 500~4000Å.

1 15. The method of claim 11, wherein the method of
2 patterning the non-silicon-containing resist layer and the
3 silicon-containing resist layer comprising the steps of:

4 patterning the silicon-containing resist layer using a
5 lithography process; and
6 using the silicon-containing resist layer as a mask,
7 etching the non-silicon-contained resist layer
8 thereunder.

1 16. The method of claim 15, wherein the method of
2 etching the non-silicon-contained resist layer comprises
3 using SO₂/O₂ as etching gases.

1 17. The method of claim 11, wherein the selective
2 deposition process is liquid phase oxide deposition (LPOD) .

1 18. The method of claim 17, wherein the process of the
2 liquid phase oxide deposition comprises immersing the
3 substrate surface in H₂SiF₆ solution with H₃BO₃.

1 19. The method of claim 17, wherein the process of the
2 liquid phase oxide deposition comprises immersing the
3 substrate surface in H₂SiF₆ and NH₃ solution.

1 20. The method of claim 11, further comprising:
2 filling a metal material into the contact opening of
3 the insulator layer to form a contact plug.